

The Salivary glands

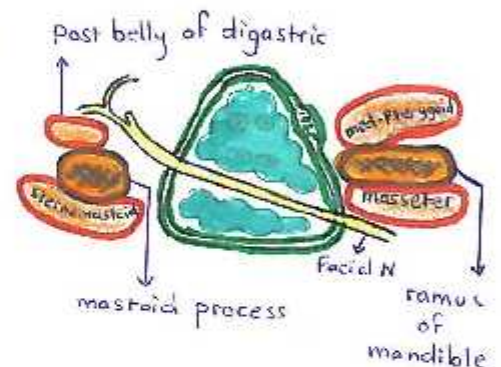
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Anatomy

The Salivary glands comprise three paired glands which are :
parotid , submandibular & sublingual together with
tiny accessory salivary glands scattered over the walls
of the buccal cavity.

Parotid gland

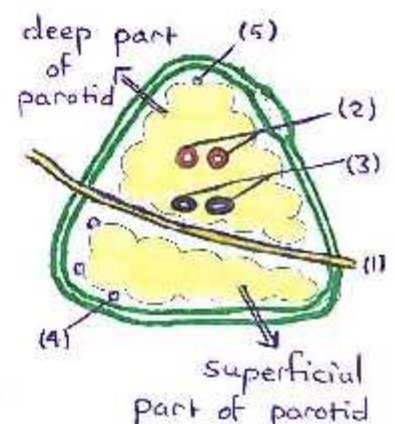
- wedge shaped gland , it represent the largest salivary gland .
- it's situated below external auditory meatus & lie ~
behind ramus of the mandible
infront sternocleidomastoid .
- The facial nerve pass within the parotid gland & divide it into :
Deep & Superficial parts
- 20% of population have accessory part .



Relation ~
anteriorly : ramus of mandible
masseter muscle & medial pterygoid
posteriorly : mastoid process
sternomastoid ms
posterior belly of digastric ms

Structures lie within the parotid gland ~

- (1) • Facial nerve
- (2) • terminal branches of external carotid artery
- (3) • retromandibular veins
- (4) • L.Ns
- (5) • auriculotemporal nerve

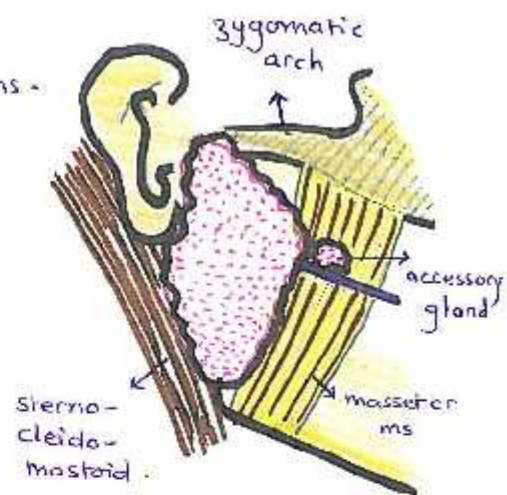


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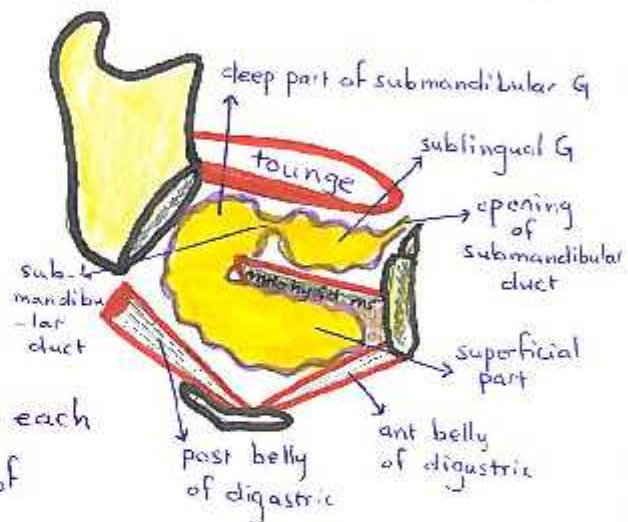
Parotid duct (Stensen duct) $\rightarrow$

- about 5 cm in length.
- it pass forward over the masseter ms.
- then it run medially & pierce the buccal pad & buccinator ms.
- finally it OPENS into vestibule of mouth OPPOSITE TO UPPER SECOND MOLAR TOOTH.



Submandibular gland

- mixed gland composed of :- serous & mucus acini.
- it's composed of two parts :-
 - (1) large superficial part
 - (2) small deep part.
- the two parts are connected to each other around posterior border of mylohyoid muscle.
- the gland is situated in [Digastric Δ]



Digastric Δ Formed by
ant. belly of digastric
post belly of digastric
inferior border of mandible

Submandibular duct (Wharton's duct) $\rightarrow$

- it emerge from deep part of the gland
- it run forward above mylohyoid muscle
- then it OPENS into the mouth floor through a papilla at the BASE OF FRENULUM OF TONGUE.

N.B

lingual N run with Wharton's duct 1st above then laterally & finally medial to the duct.

Physiolog of salivary glands

- the daily secretion ranges between 800 - 1500 mL.
- the saliva contain 2 major types of protein secretions :-

1. Serous secretion $\rightarrow$ contain alpha amylase for starch digestion.

2. Mucous secretion $\rightarrow$ contain mucin for lubrication

- the submandibular secretion represent 75% of total saliva produced.
- the PH of saliva range betn 6.0 - 7.0

N.B

parotid saliva $\rightarrow$ Serous.
submandibular saliva $\rightarrow$ mixed.
sublingual saliva $\rightarrow$ mucous.

Lymphatic drainage

all salivary glands drain into upper cervical (deep) L.Ns

Function of saliva

- (1) articulation.
- (2) buffering the changes in oral PH $\rightarrow$ so prevent dental caries.
- (3) cleaning & antibacterial action (lysozyme & thiocyanate).
- (4) Digestion.
- (5) Deglutition.
- (6) excretion of fluoride, iodide & mercury.
- (7) H₂O regulation.
- (8) Heat regulation.
- (9) facilitate stimulation of taste buds.
- (10) secrete growth factor, glucagon, somatostatine & renine.

Salivary glands disorders

(I) Inflammation →

- mumps
- acute bacterial infection
- calculus
- chronic recurrent sialadenitis
- mikulicz's syndrome.

(II) Culculi

(III) Salivary tumors

(4) Mumps

- viral infection → caused by paramyxovirus.
- common in children
- affect parotid gland & it's usually bilateral. (rarely sub-mandibular & sublingual)
- it's the commonest cause of painful parotid swelling.

mumps may present to the surgeon in the following ways :-

- (1) acute parotitis → . usual in childhood
- (2) mumps orchitis → . usual in adolescent
 - pain & swelling of testicle occur 7-10 days after parotitis & may lead to testicular atrophy.
 - if bilateral orchitis occur → sterility
- (3) pancreatitis .
- (4) mastitis
- (5) thyroiditis .
- (6) oophoritis .

* most of children are now vaccinated against mumps before starting school.

(2) Acute bacterial Parotitis

- ascending infection of parotid gland via it's duct.
- usually it's caused by **Streptococcal infection** (viridans or pneumoniae) occasionally by staphylococci

Causes →

- 1- dental sepsis
- 2- dehydration
- 3- prolonged presence of NGT
- 4- poor oral hygiene.
- 5- Severe debilitating illness
- 6- uremia

CIP →

- swelling with intense pain
- hard enlarged tender gland
- often ass. with trismus (masseter spasm)
- purulent discharge from the duct
- abscess formation may occur.

treatment →

- adequate hydration.
- encourage flow of saliva by sucking sweets or chewing gum.
- parenteral antibiotics
- incision & drainage in case of abscess formation by **Heltong method** → in w the skin is opened vertically & the parotid is opened horizontally.

(3) Chronic recurrent Parotid sialadenitis

- repeated episodes of pain & swelling in one or both parotids.

Cause → combination of obstruction & infection of the gland.

Investigations → Sialogram w will show →

- Sialectasia → dilatation of the duct system
- stricture of the duct or stone.

treatment ↪

- dilatation in case of strictures.
- stone removal.
- daily massage of the gland several times.
- Sialogogues ↪ such as lemon drop ↪ encourage drainage.
- in sever cases the gland is excised with preserving facial N.

(4) Mikulicz's syndrome

- syndrome characterized by ↪
 - enlarged salivary & lacrimal glands
 - dry eyes
 - keratoconjunctivitis
 - dry mouth (Xerostomia)
- it may occur in ↪
 1. sarcoidosis (commonest)
 2. lymphoma especially Non-Hodgkin.
 3. T.B
 4. Sjogren's syndrome.

N.B

Sjogren's syndrome :

- autoimmune degenerative condition characterized by progressive destruction of salivary & lacrimal glands.
- it affect mainly middle aged ♀
- it's a combination of ↪
 - ① C.T disorder e.g SLE or Rh. arthritis
 - ② Dry eyes (keratoconjunctivitis sicca)
 - ③ Dry mouth (Xerostomia)
- it's classified into 1ry & 2ry.
 - **1ry** ↪ No underlying C.T disorder ass with sever xerostomia & affect exocrine GIT glands & lacrimal glands.
 - **2ry** ↪ ass with C.T disorder (10 ♀ : 1 ♂)

- may investigated by $\rightarrow$
 - sialography
 - salivary gland biopsy
- treatment is mainly for symptoms $\rightarrow$
 - artificial tears
 - artificial saliva
 - frequent drinks
 - steroid therapy.

(5) Calculi (Sialolithiasis)

Stone formation is common in submandibular gland & it's duct

- B/C $\rightarrow$
- more viscid secretion
 - long tortuous duct
 - move against gravity. (saliva)

it's rare in parotid.

- the stones are formed of Ca^{++} phosphate & Ca^{++} carbonate.

Predisposing Factors $\rightarrow$

- trauma
- infection
- change in saliva composition
- metabolic diseases e.g hyperparathyroidism
w/ ass with $\uparrow \text{Ca}^{++} \rightarrow$ stone formation.

C/P $\rightarrow$

- painful swelling of affected gland. exaggerated by food.
- unpleasant taste due to purulent discharge.

by examination $\rightarrow$

- the gland is enlarged & tender.
- the opening of the duct is red & swollen & purulent exudate may get out of it by gentle pressure.
- calculus may be visible or palpable on bimanual Ex.

Investigations $\rightarrow$

- it might be diagnosed by palpation
- X-ray $\rightarrow$ showing radioopaque shadow of stone.

- Sialogram may show filling defect, stricture or sialiectasis.

treatment →

- intra oral removal of stone with duct being marsupialized at site of extraction.
- Sialadenectomy (removal of the whole gland) if one or more stones are impacted in the gland.

Salivary tumors

they are classified into :-

(I) Benign →

- (1) pleomorphic adenoma (mixed salivary tumor)
- (2) adenolymphoma.

(II) Malignant →

- (1) 1^{ry} →
 - squamous carcinoma
 - adenocystic carcinoma
 - adenocarcinoma
 - Lymphoma.
- (2) 2^{ry} → direct from skin or involved L.Ns.

N.B → oncocytoma & mucoepidermoid tumor are intermediate tumors

(1)

Pleomorphic adenoma

- it's the commonest tumor of salivary glands.
- 90% of cases occur in parotid gland. (usually superficial part)
- 90% of cases are below age of 50
- incidence is equal in ♂ & ♀

Pathology →

- Macroscopic appearance :-
- lobulated tumor
 - lie within false capsule
 - C/S is glistening & translucent
- (i) with crumbly consistency.

- Microscopic appearance :-
- glandular acini within blue staining stroma resemble the cartilage (so named mixed tumor)
 - False capsule.
 - Serial sections show amoeboid processes w may invade the surrounded normal tissue.

CIP ~

- slow growing swelling usually in the superficial part.
- painless well defined
- firm to hard in consistency some times cystic.
- mobile not attached to overlying skin.
- facial N is NEVER invaded unless it become malignant

N.B ~

- pleomorphic adenoma was known as mixed tumor b/c it have some criteria of benign tumors & others of malignant tumors
- it resemble benign tumors in slow growing
- it resemble malignant tumors in ~
 - lack of encapsulation
 - infiltration of surroundings
 - not well differentiated
 - metastasize to regional L.Ns & distantly via blood stream.

Signs of changing into malignancy are ~

- 1- become painfull
- 2- rapid growth
- 3- become hard
- 4- fixed to the skin
- 5- invasion of facial N → facial N palsy.

N.B ~

5% of cases will change into malignancy & they have poor prognosis. 17

Investigations ~>

U/S , bone CT scan , MRI
FNAC → (specific & sensitive)

treatment ~>

- 1- enucleation of adenoma ~> But it have 25% risk of recurrence b/c :-
 - False capsule
 - amoeboid processes
 - implantation of tumor cells in the wound.
- 2- wide excision with safe margin & careful preservation of facial N is the best solution.
- 3- for other salivary glands the best solution is sialadenectomy.
- 4- radiotherapy after surgery to prevent recurrence.

Prognosis ~>

- complete excision of the gland have excellent prognosis
- 20% of recurrent cases after surgery will have malignant transformation.

(2)

Adenolymphoma

- known also as Warthin's tumor
- occurs mainly in parotid & it represent 10% of parotid tumors
- occasionally it's bilateral
- occurs in 0-7 over 50 years old.
- ↑ in smokers

Pathology ~>

Macroscopically :-

Microscopically :-

soft, cystic, superficial & bilateral
it arise from salivary duct epithelium
consist of papillary fingers formed
of columnar cells which project into
cystic spaces & supported by lymphoid
tissue that originate from lymphoid
aggregations in the gland.

Investigations $\rightsquigarrow$ isotope scan with Tc^{99} $\rightarrow$ show hot spots

treatment $\rightsquigarrow$ local removal.

Prognosis $\rightsquigarrow$ excellent, No recurrence.

(3) Carcinoma

- usually it affect the parotid.
- incidence is equal in σ & ϕ
- usually affect people who are > 50 yrs old.
- microscopically most of them are adenocarcinoma.

C/P $\rightsquigarrow$ rapidly growing painful swelling.
involvement of facial N & regional L.Ns
overlying skin become ulcerated.

Types of carcinoma:

(1) acinic cell carcinoma $\rightsquigarrow$

- represent 25% of malignant parotid tumors
- it grows slowly. with late invasion to regional L.Ns
- recur after removal

(2) adenoid cystic carcinoma $\rightsquigarrow$

- represent 7% of salivary gland tumors
- usually affect minor salivary glands.
- spread by direct spread or metastasize to L.Ns, lungs & bone.
- it have special tendency to spread along nerve sheath.

(3) mucoepidermoid carcinoma $\rightsquigarrow$

- more aggressive tumor represent 3-4%.
- found in major salivary glands.

(4) adenocarcinoma -

(5) squamous cell carcinoma.

Spread ~>

- 1- Lymphatics → to submandibular L.Ns → upper deep cervical.
- 2- Blood → to lungs (canon ball tumor)
to bones.
- 3- Direct to the surroundings → to mandible
masseter ms
facial N.

Investigations ~>

- CT, U/S, MRI, Bone scan. for metastasis
- isotope scan → show cold spot.
- FNAC.

treatment ~> total parotidectomy with sacrifice of facial N & block dissection of regional L.Ns followed by radiotherapy.

N-B

- Sialadenitis : inflammation of salivary glands
- Sialactasia : dilatation of salivary gland ducts
- Sialorrhea : ↑ salivary flow.

Causes →

- aphthous ulcer
- iodine
- reflux oesophagitis
- metals poisoning

- Xerostomia : dry mouth

Causes →

- (1) antimuscarinic drugs
atropin
antiemetic
TCADs
- (2) sympathetic drugs
amphetamine